SMD Operations Procedures Manual

8.1.1.35 TEST OF SAFETY INTERLOCKS OF 8.5kA POWER SUPPLY

Text Pages 1 through 9
Attachment(s) 1, 2, 3, 4

Hand Processed Changes

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Preparer(s): J. Cintorino, J. McNeil

8.1.1.35 Test of Safety Interlocks of 8.5kA Power Supply

1.0 Purpose and Scope

1.1 The purpose of this Procedure is to provide step by step instruction in testing the Kirk Locks, electrical door interlocks, "crash" push buttons, DC overcurrent protection circuits, and warning lights associated with the 8.5 kA Vertical Test Power Supply.

2.0 Responsibilities

2.1 The Cognizant Engineer for the 8.5kA Vertical Test Power Supply, or the Electrical Systems Section Head, shall:

A. designate those persons authorized to perform the procedure;

B. establish and maintain a list of authorized persons;

C. appoint a Cognizant Technician for the interlock test database;

D. review the completed "Check List for Safety Interlock Test" (Attachment 1) and sign the "Interlock Test Approval Form" (Attachment 2).

2.2 The Cognizant Technician shall:

A. initiate the procedure, when required;

B. establish and maintain a paper database for the interlock test;

C. arrange for the "Interlock Test Approval Form" to be posted at the required locations.

2.3 The Authorized Person shall:

A. shall supervise all aspects of the safety interlock test procedure.

B. perform the Electrical Door Interlocks part of the procedure due to SEAPPM 1.5.0, sectionIV Range AB@ hazards.

C. complete the "Check List for Safety Interlock Test".

2.4 The Operator shall perform those actions involving normal operation of the supply.

3.0 Prerequisites

3.1 The Authorized Person shall:

A. be trained by the Cognizant Engineer;

B. have a generic energized work permit for Range B hazards, as per SEAPPM 1.5.0, section IV.;

C. be trained as a "Responsible Employee", as per SEAPPM 1.5.1, "Lockout/Tagout Requirements".

3.2 The Operator shall be an authorized control room operator for the Vertical Test Facility.

4.0 Precautions

4.1 The procedure requires that the Kirk Lock system be bypassed, or "defeated", during some tests. The Kirk Lock system shall be restored to full working order after the procedure is completed.

4.2 All doors that were unlocked for the purpose of testing the interlocks shall be locked when the procedure is completed.

4.3 The Supply must be in a "short" condition before performing this procedure or any section of this procedure.

5.0 Procedure

NOTE 1 ***The test should be performed every six months.***

NOTE 2 ***Use the Check List (Attachment 1) as a guide in locating each safety device. As each device is tested successfully, check it off.***

NOTE 3 ***If a device fails, stop work and immediately notify the Cognizant Engineer and the ES&H Coordinator.***

NOTE 4 ***Most of the tasks are to be performed by the Operator. When a task, or series of tasks, must be performed by another person, that person is indicated by a bulleted heading before the first task (for instance "▸ Operator: ").***

▸ Operator:

5.1 Configure the Supply in a "short" condition, by performing the following steps:

WARNING

Failure to follow proper Lock Out/Tag Out procedures while working inside the VTF Distribution Box could result in severe injury.

NOTE ***The power supply is routed through the VTF Distribution Box: the 8.5kA Vertical Test Supply***

5.1.1 Lock and tag the 460V Input Disconnect Switch labeled " E22-1".

5.1.2 Remove Kirk lock key #18 from the Switch.

5.1.3 Open the VTF Distribution Box by unlocking Kirk lock RE11475 (key #18).

5.1.4 Verify that the system is de-energized by using a "Wiggy".

5.1.5 Verify that all mating surfaces are clean and free of debris.

5.1.6 Configure the links so that the 8.5kA Supply output is shorted.

5.1.7 Tighten all nuts securely.

5.1.8 Close the VTF Distribution Box, lock the Kirk Lock, and install and secure all cover panels.

5.1.9 Fill out a "Distribution Status Log" sheet (Attachment 4) , and post the ALink Box Condition@ card describing the supply configuration (Attachment 3) to the outside of the VTF Distribution Box.

5.2 Configure the 8.5kA Remote Control Rack (rack #VTF 1), located adjacent to the Supply, for resistive load.

5.3 Set the "LOCAL/REMOTE" selector switch, located on the outside of the Control Cubicle of the Supply, to "LOCAL".

5.4 Remove lock and tag from Input Disconnect Switch " E22-1Kirk Key Lock Mechanical Interlock

5.5 The Kirk Key Lock Mechanical Interlock is tested by performing the following steps:

5.5.1 Use the key to open the Lock at Input Disconnect Switch E22-1.

5.5.2 Place the Switch in the "ON" position.

5.5.3 Attempt to turn the key to remove it. Verify that this cannot be done.

5.5.4 Place the Switch in the "OFF" position.

5.5.6 Remove the key from the Disconnect Switch and use it to unlock the Kirk Lock on the VTF Distribution Box.

5.5.7 Attempt to remove the key. Verify that this cannot be done.

5.5.8 Relock the Kirk Lock and remove the key.

5.5.9 Use the key to unlock the Control Cubicle door.

5.5.10 Attempt to remove the key while the door is unlocked. Verify that this cannot be done.

5.5.11 Relock the door and remove the key.

▸ Authorized Person:

5.6 Electrical Door Interlocks

The electrical Door Interlocks on those doors with Kirk key locks are tested by performing the following steps:

5.6.1 Defeat the captive key lock permitting access with power on.

5.6.2 Leave the door open enough to activate the Interlock switch.

5.6.3 Place the Input Disconnect Switch in the "ON" position. The red "POWER ON" light, and all of the white fault lights, should illuminate.

5.6.4 Depress the black "STANDBY/RESET" pushbutton.

5.6.5 Verify that the white fault light labeled "DOOR" remains illuminated. The other fault lights should extinguish.

5.6.6 Depress the black "DC ON" pushbutton.

5.6.7 Verify that the Supply does not turn on by observing that the DC Voltage and DC Current meters read zero and the red "DC ON" light remains extinguished.

5.6.8 Place the Input Disconnect Switch in the "OFF" position.

5.6.9 Close the door and lock the Kirk key lock.

5.6.10 Place the Input Disconnect Switch in the "ON" position.

5.6.11 Depress the black "STANDBY/RESET" pushbutton.

5.6.12 Verify that all white fault lights extinguish and the amber READY light illuminates.

5.6.13 Place the Input Disconnect Switch in the "OFF" position.

5.6.14 Repeat steps 5.6.1 to 5.6.13 for all electrical Door Interlocks on those doors with Kirk key locks.

5.7 The electrical Door Interlocks on those doors or panels without Kirk key locks are tested by performing the following steps:

5.7.1 Leave the door or panel open enough to activate the Interlock switch.

5.7.2 Place the Input Disconnect Switch in the ON position. The red "POWER ON" light, and all of the white fault lights, should illuminate.

5.7.3 Depress the black "STANDBY/RESET" pushbutton.

5.7.4 Verify that the white fault light labeled "DOOR" remains illuminated. The other fault lights should extinguish.

5.7.5 Depress the black "DC ON" pushbutton.

5.7.6 Verify that the Supply does not turn on by observing that the DC Voltage and DC Current meters read zero and the red "DC ON" light remains extinguished.

5.7.7 Close the door or panel. Verify that the "DOOR" fault light remains illuminated.

5.7.8 Depress the black "STANDBY/RESET" pushbutton.

5.7.9 Verify that the "DOOR" fault light extinguishes and the amber "READY" light illuminates.

5.7.10 Place the Input Disconnect Switch in the "OFF" position.

5.7.11 Repeat steps 5.7. 1 to 5.7. 10 for all electrical Door Interlocks on those doors or panels without Kirk key locks.

5.8 Crash Buttons

The crash buttons are tested by performing the following steps:

NOTE 1 ***The Supply must be operated remotely by an authorized control room operatorfor this test.***

NOTE 2 ***The Authofized Person may assist the Operator by depressing the crash buttons while the Operator monitors and controls the Supply.***

▸ Operator:

5.8.1 From the VCR, energize the Supply, reset faults, and turn the DC output on.

5.8.2 Command an output current of IOOA.

5.8.3 Depress a crash button. Verify that the Supply goes to a fault state and that "CRASH" is indicated on the computer monitor.

5.8.4 Repeat steps 5.8.1 to 5.8.3 for the other crash buttons to be tested.

5.8.5 Shut down the Supply.

5.9 DC Overcurrent

The DC Overcurrent interlock of each power supply is tested by performing the following steps:

NOTE ***The power supplies must be operated remotely by an authorized control room operatorfor this test.***

5.9.1 With Input Disconnect Switch E22-1 in the OFF position, remove the Kirk key from the Switch.

5.9.2 Using the Kirk key, enter the Control Cubicle of the 8.5kA Supply.

5.9.3 Reduce the DC Overcurrent relay trip level to 500A.

5.9.4 Lock the Cubicle door.

▸ Operator:

5.9.5 From the VCR, energize the Supply, reset faults, and turn the DC output on.

5.9.6 Command an output current of 2,OOOA and monitor the output current.

5.9.7 Verify that at approximately 1,OOOA output current, the power supply shuts off and indicates a "DC OVERCURRENT" on the computer monitor.

5.9.8 Reset the fault and verify that a "READY" state can be obtained.

5.9.9 Shut down the power supply.

▸ Authorized Person:

5.9.10 Remove the Kirk key from the Input Disconnect Switch.

5.9.1 1 Using the Kirk key, re-enter the Control Cubicle and return the DC Overcurrent trip setting to its initial value.

5.9.12 Lock the Cubicle door.

5.10 "PS ON" Warninig Lights

The "PS ON" Warning Lights are tested by performing the following steps:

NOTE 1 ***The power supply must be operated remotely by an authorized control room operator for this test.***

NOTE 2 ***The Authorized Person may assist the Operator by standing outside the Control Room and verifying that the lights are on or Off.***

▸ Operator:

5.10.1 From the VCR, energize the control circuits and bring the Supply to a "READY" state by means of the computer controls.

5.10.2 Verify that the Warning Lights are still off.

5.10.3 Put the Supply in the "ON" state at minimum current.

5.10.4 Verify that the Warning Lights are flashing.

5.10.5 De-energize the Supply.

5.10.6 Verify that the Warning Lights extinguish.

▸ Authorized Person:

5.11 Complete, date, and sign the Check List.

▸ Cognizant Engineer:

5.12 Review the Check List and, if approved, sign the "Interlock Test Approval" form (Attachment 2).

▸ Cognizant Technician:

5.13 Post a copy of the signed "Interlock Test Approval" form on the Control Cubicle of the 8.5kA Supply, on the VTF Distribution Box, and in the Vertical Control Room.

5.14 File one copy of the Check List and one copy of the Approval Form.

6.0 Documentation

6.1 Check List for Test of Safety Interlocks.

6.2 Interlock Test Approval Form

6.3 Dewar Short card

6.4 Distribution Status Log Sheet

7.0 References

7.1 SEAPPM 1.5.1, "Lockout/Tagout Requirements"

7.2 SEAPPM 1.5.0, section IV, generic energized work permit requirements.

7.3 SMD-OPM 8.1.1.3 , AOperation of 8.5kA Power Supply for Vertical MagnetTesting@

8.0 Attachments

1. Check List for Test of Safety Interlocks
2. Interlock Test Approval Form
3. Dewar Short card
4. Distribution Status Log sheet

Attachment 1

Check List for Test of Safety Interlocks

CHECK LIST FOR TEST OF SAFETY INTERLOCKS
8.5kA VERTICAL TEST POWER SUPPLY

DESIGNATION	DESCRIPTION	√
VTP KL-1	Kirk lock #RE11475 on PS Control Cubicle door	
VTP KL-2	Kirk lock #RE11475 on Disconnect Switch #KS2-1	
VTP KL-3	Kirk lock #RE11475 on VTP Distribution Box	
VTP DIL-1	Door Interlock on PS Control Cubicle door	
VTP DIL-2	Door Interlock on PS front access panel	
VTP DIL-3	Door Interlock on VTP Distribution Box	
VTP DIL-4	Door Interlock on VTP Distribution Box	
VTP DIL-5	Door Interlock on VTP Distribution Box	
VTP DCO-1	DC overcurrent interlock	
VTP CB-1	Crash button on Remote Control Cabinet VTP 1	
VTP CB-2	Crash button in VCR	
VTP CB-3	Crash button in VCR	
VTP CB-4	Crash button in cryo area	
VTP WL-1	Warning Light over VTP Distribution Box	
VTP WL-2	Warning Light over power supply	
VTP WL-3	Warning Light over dewars 2 and 3	

Test date _____ Tested by_____ Life_____

Attachment 2

Interlock Test Approval Form

Safety Interlock Test Approval

The safety interlocks of the 8.5kA Power Supply System have been tested and approved

Approval Date_____

The approval is valid until the expiration date shown. DO NOT OPERATE THE 8.5kA POWER SUPPLIES AFTER THE EXPIRATION DATE.

Expiration Date_____

Approval Signature (CE or ESSH) _____

Post on 8.5kA Supply Control Cubicle

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Safety Interlock Test Approval

The safety interlocks of the 8.5kA Power Supply System have been tested and approved

Approval Date_____

The approval is valid until the expiration date shown. DO NOT OPERATE THE 8.5kA POWER SUPPLIES AFTER THE EXPIRATION DATE.

Expiration Date_____

Approval Signature (CE or ESSH) _____

Post on VTF Distribution Box

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Approval Date_____

The approval is valid until the expiration date shown. DO NOT OPERATE THE 8.5kA POWER SUPPLIES AFTER THE EXPIRATION DATE.

Expiration Date_____

Approval Signature (CE or ESSH) _____

Post in Vertical Control Room

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Safety Interlock Test Approval

The safety interlocks of the 8.5kA Power Supply System have been tested and approved

Approval Date_____

The approval is valid until the expiration date shown. DO NOT OPERATE THE 8.5kA POWER SUPPLIES AFTER THE EXPIRATION DATE.

Expiration Date_____

Approval Signature (CE or ESSH) _____

File Copy

Attachment 3

The VCR MPS 8.5 Ka Distribution is in a

* SHORT *

Attachment 4 - VCR MPS 8.5 kA Distribution (Link Box) Status Log Sheet

Item	Change Date	Dewar # 2	Dewar # 3	Short	Open	Magnet	Operator	Checked By	Red Tag #
1									
2									
3									
4									
5									
6									
7									
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